

Sub
A2

A biocompatible tissue repair stimulating implant, comprising:

a bioabsorbable polymeric foam component having pores with an open cell pore structure; *aliphatic polyesters (lactide, glycolide, caprolactone)*

a reinforcing component formed of a biocompatible, mesh-containing material, wherein the foam component is integrated with the reinforcing component such that the pores of the foam component penetrate the mesh of the reinforcing component and interlock with the reinforcing component; and *woven and nonwoven PLA PGA PCL PVA*
at least one biological component in association with the implant.

2. The implant of claim 1, wherein the biological component is contained within pores of the foam component.

3. The implant of claim 2, wherein the biological component is selected from the group consisting of antibiotics, antimicrobial agents, an anti-inflammatory agents, growth factors, hormones, cytokines, proteins, glycosaminoglycans, immunosuppressants, nucleic acids, analgesics, cell types, and combinations thereof.

4. The implant of claim 3, wherein the protein is selected from the group consisting of a pleiotrophin, endothelin, tenascin, fibronectin, fibrinogen, vitronectin, V-CAM, I-CAM, N-CAM, elastin, fibrillin, laminin, actin, myosin, collagen, microfilament, intermediate filament, antibody, and fragments thereof.

5. The implant of claim 3, wherein the growth factor is selected from the group consisting of a TGF- β , bone morphogenic protein, fibroblast growth factor, platelet-derived growth factor, vascular endothelial cell-derived growth factor, epidermal growth factor, insulin-like growth factor, hepatocyte growth factor, and fragments thereof.
6. The implant of claim 5, wherein the growth factor is autologous.
7. ~~The implant of claim 3, wherein the glycosaminoglycan is selected from the group consisting of heparan sulfate, heparin, chondroitin sulfate, dermatan sulfate, keratin sulfate, hyaluronan, and combinations thereof.~~
8. ~~The implant of claim 3, wherein the cell type is selected from the group consisting of osteocytes, fibroblasts, stem cells, pluripotent cells, chondrocyte progenitors, chondrocytes, osteoclasts, osteoblasts, endothelial cells, macrophages, adipocytes, monocytes, plasma cells, mast cells, umbilical cord cells, leukocytes, stromal cells, mesenchymal stem cells, epithelial cells, myoblasts, and bone marrow cells.~~
9. The implant of claim 1, wherein the foam component is present in one or more layers.
10. The implant of claim 9, wherein adjacent foam layers are integrated with one another by at least a partial interlocking of pores.

11. The implant of claim 1, wherein the reinforcing component is present in one or more layers.
12. The implant of claim 9, wherein separate foam layers are constructed of different polymers.
13. The implant of claim 12, wherein the properties of the foam component vary throughout a thickness dimension of the implant.
14. The implant of claim 13, wherein outer layers of the implant have a greater overall pore volume than does an inner region thereof.
15. The implant of claim 13, wherein an inner region of the implant has a greater overall pore volume than do outer layers of the implant.
16. The implant of claim 14, wherein the concentration of the biological component is greater in the outer layers than in the inner region.
17. The implant of claim 15, wherein the concentration of the biological component is greater in the inner region than in the outer layers.
18. A method of treating a tissue injury, comprising:
providing a biocompatible tissue repair stimulating implant including a

bioabsorbable polymeric foam component having pores with an open cell pore structure and a reinforcing component formed of a biocompatible, mesh-containing material, wherein the foam component is integrated with the reinforcing component such that the pores of the foam component penetrate the mesh of the reinforcing component and interlock with the reinforcing component;

loading the implant with at least one biological component; and

placing the implant in a desired position relative to the tissue injury.

19. The method of claim 18, further comprising the step of affixing the implant in the desired position.

20. The method of claim 18, wherein the step of loading is conducted before placing the implant in a patient.

21. The method of claim 18, wherein the step of loading is conducted after placing the implant in a patient.

22. The method of claim 18, wherein the step of loading is conducted by a technique selected from the group consisting of injecting the biological component into the implant, immersing the implant in a biological component-containing solution, mixing the implant with the biological component, spreading the biological component on to the implant, and placing the biological component into the implant.

23. The implant of claim 18, wherein the biological component is selected from the group consisting of antibiotics, antimicrobial agents, anti-inflammatory agents, growth factors, hormones, cytokines, proteins, glycosaminoglycans, immunosuppressants, nucleic acids, analgesics, cell types, and combinations thereof.

24. The implant of claim 23, wherein the protein is selected from the group consisting of a pleiotrophin, endothelin, tenascin, fibronectin, fibrinogen, vitronectin, V-CAM, I-CAM, N-CAM, elastin, fibrillin, laminin, actin, myosin, collagen, microfilament, intermediate filament, antibody, and fragments thereof.

Method, not implant

25. The implant of claim 23, wherein the growth factor is selected from the group consisting of a TGF- β , bone morphogenic protein, fibroblast growth factor, platelet-derived growth factor, vascular endothelial cell-derived growth factor, epidermal growth factor, insulin-like growth factor, hepatocyte growth factor, and fragments thereof.

26. The implant of claim 25, wherein the growth factor is autologous.

27. The implant of claim 23, wherein the glycosaminoglycan is selected from the group consisting of heparan sulfate, heparin, chondroitin sulfate, dermatan sulfate, keratin sulfate, hyaluronan, and combinations thereof.

28. The implant of claim 23, wherein the cell type is selected from the group consisting of osteocytes, fibroblasts, stem cells, pluripotent cells, chondrocyte progenitors, chondrocytes,

osteocytes, osteoclasts, osteoblasts, endothelial cells, macrophages, adipocytes, monocytes, plasma cells, mast cells, umbilical cord cells, leukocytes, stromal cells, mesenchymal stem cells, epithelial cells, myoblasts, and bone marrow cells.

29. The method of claim 23, wherein the cell type associated with the implant comprises at least one cell that is responsive to one or more stimulators, wherein upon stimulation the cell secretes one or more cellular proteins.

30. The method of claim 29, wherein the stimulator is delivered to the implant prior to surgical implantation of the implant.

31. The method of claim 29, wherein the stimulator is delivered to the implant following surgical implantation of the implant.

32. The method of claim 19, wherein the step of affixing the tissue implant is accomplished by applying a fastener across the implant and adjacent tissue.

33. The method of claim 32, wherein the fastener is selected from the group consisting of sutures, staples, suture anchors, tissue tacks, darts, screws, arrows, fibrin glue, fibrin clots, biologically compatible adhesives, and combinations thereof.

34. The method of claim 18, wherein the tissue injury is selected from the group consisting of meniscal injury and rotator cuff injury.

35. The method of claim 18, wherein the implant is placed within the lesion that constitutes a tissue injury.

36. The method of claim 35, wherein the implant is of a size and shape such that it matches a geometry and dimension of the lesion.

37. The method of claim 35, wherein the implant is placed within the lesion in an interference fit.

38. The implant of claim 28, wherein the cell type is added to a gel-like carrier prior to injection into the implant.

39. A method of treating a tissue injury, comprising:

providing a biocompatible tissue implant including a bioabsorbable polymeric foam component having pores with an open cell pore structure and a reinforcing component formed of a biocompatible, mesh-containing material, wherein the foam component is integrated with the reinforcing component such that the pores of the foam component penetrate the mesh of the reinforcing component and interlock with the reinforcing component;

placing the tissue implant within a lesion that constitutes the tissue injury;

affixing the tissue implant in the lesion; and

loading a biological component within the implant that is placed and affixed within the lesion.

40. The method of claim 39, wherein the biological component is loaded after the implant is placed and affixed within the lesion, and wherein the biological component is contained within pores within the foam component of the implant.
41. The method of claim 39, wherein the step of loading is effected by injecting the biological component into the implant.
42. The method of claim 39, wherein the biological component is selected from the group consisting of antibiotics, antimicrobial agents, anti-inflammatory agents, growth factors, hormones, cytokines, proteins, glycosaminoglycans, immunosuppressants, nucleic acids, analgesics, cell types, and combinations thereof.
43. The method of claim 42, wherein the lesion is formed in meniscal cartilage and the implant is placed and affixed within the lesion.
44. The method of claim 42, wherein the lesion is a tear of the rotator cuff and the implant is placed and affixed within the lesion.
45. The method of claim 43, wherein the implant has multiple layers of the foam component and the outer layers have a lower pore density than the inner layers thereof.

46. The method of claim 45, wherein a greater concentration of the biological component is present in the inner layers of the implant.

47. The method of claim 44, wherein the implant has multiple layers of the foam component and the outer layers have a lower pore density than the inner layers thereof.

48. The method of claim 47, wherein a greater concentration of the biological component is present in the inner layers of the implant.

49. The method of claim 39, wherein the step of loading occurs after the step of placing and before the step of affixing.

50. A method of treating a tissue injury, comprising:

providing a biocompatible tissue implant including a bioabsorbable polymeric foam component having pores with an open cell pore structure and a reinforcing component formed of a biocompatible, mesh-containing material, wherein the foam component is integrated with the reinforcing component such that the pores of the foam component penetrate the mesh of the reinforcing component and interlock with the reinforcing component;

placing the tissue implant within a lesion that constitutes the tissue injury;

loading a biological component within the implant that is placed within the lesion; and

affixing the tissue implant in the lesion.

51. A method for making a tissue repair stimulating implant, comprising:

- providing a solution of a foam forming polymeric material in a suitable solvent;
- providing a mesh-like reinforcing material;
- placing the reinforcing material in a mold in a desired position and at a desired orientation;
- adding the solution to the mold in a controlled manner;
- lyophilizing the solution to obtain a tissue implant having a mesh reinforced foam component; and
- incorporating at least one biological component within the tissue implant.

52. The method of claim 51, wherein the step of incorporating is accomplished by adding the biological component to the solution before the step of lyophilizing.

53. The method of claim 51, wherein the step of incorporating is accomplished by adding the biological component following the step of lyophilizing.